Session B21: "Toward Large Scale Assessments of Soil Carbon Turnover and Vulnerability: Measures, Models, and Networks"

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TITLE

Filling holes in regional carbon budgets: predicting peat depth and volume in a north-temperate lake district

BODY

Peat deposits are estimated to contain 1/6 of all terrestrial fixed carbon (C) globally, and C in peat far exceeds that in live vegetation in many north-temperate and boreal landscapes. Knowledge of peat depth is critical, since vulnerability of peat C to oxidation varies greatly with depth. However, regional estimates of C stored in peatlands are uncertain, largely because variation in peat depth is not well understood. To estimate the C stored in peat in the Northern Highlands Lake District (NHLD) in northern Wisconsin, which contains 20% peatlands by area, we sampled 21 peatlands during summer 2008. Our study addressed two questions: (1) How spatially variable are peat depth and volume within and among peatlands of the NHLD? (2) To what degree can peat depth and volume be predicted from available spatial and/or field data? In each peatland (area range 0.4 – 24 ha), peat depth was measured on a regular grid, and interpolated to calculate total peatland volume and mean peat depth. Among the 21 peatlands, mean peat depth ranged from 0.2 to 5.1 m, with an average of 1.9 m, while volume varied by 3 orders of magnitude. Peat depth varied more within than among peatlands, and the maximum measured depth was >15 m. Mean and maximum peat depth could be predicted from local slope at the peatland-upland interface, measured either in the field or using digital elevation (DEM) data. Strikingly, field measurements (water chemistry, water table depth, vegetation cover) failed to substantially improve slope-based models. As the DEM data are widely available, this technique has the potential to considerably improve regional estimates of C stored in peatlands.